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CENTRAL INTELLIGENCE AGENCY
INFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

CD NO.

COUNTRY USSR

SUBJECT Economic; Technological - Machine tools

DATE OF INFORMATION 1953

HOW PUBLISHED Monthly periodical

DATE DIST. 25 Feb 1954

WHERE PUBLISHED Moscow

NO. OF PAGES 2

DATE PUBLISHED Aug 1953

LANGUAGE Russian

SUPPLEMENT TO REPORT NO.

THIS IS UNEVALUATED INFORMATION

SOURCE Tekhnika-Molodezhi, No 8

MODEL GF-187 GIANT MILLING MACHINE

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A series of giant machine tools has been built recently by Soviet machine-tool builders for machining turbine parts. Among these machine tools is a unique milling machine, Model GF-187. The bed of this model is 17 meters long, 9.5 meters wide, and 5.5 meters high. The machine tool weighs about 180 tons, which is equivalent to the weight of two large locomotives.

The giant machine tool is exceptional not only for its size but also for the fact that all its moving mechanisms are interlocked and are automatically controlled. It is made up of more than 20,000 parts.

The milling machine has not just one bed, but three. The part to be machined is supported by a steady rest and a follow rest on the center bed. The center bed is flanked by side beds. Slides on which posts with milling heads are fastened are mounted on each side bed. The front and back posts can travel transversely on the slide ways. These slides, together with the posts can, in turn, travel parallel to the axis of the part being machined. The speed of slide travel reaches 2,000 millimeters per minute.

Each post of the new machine has four milling spindles: one vertical and three horizontal. A cylindrical mill, 510 to 750 millimeters in diameter, is fastened in the vertical spindle. This mill cuts slots from 125 to 227 millimeters deep and from 22 to 29.3 millimeters wide.

End mills are fastened in one of the horizontal spindles. They mill the outer surfaces of rotors for synchronous generators. The other two horizontal spindles are mounted in one milling head. The head is arranged in such a way that its cutters can travel horizontally or vertically, which makes it possible to mill T or dovetail slots.

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Each spindle can operate independently and its speed can be changed within a wide range. The vertical spindle can rotate at a speed of 6 to 90 rpm; the horizontal spindle for the end mill, from 50 to 160 rpm; and the other two spindles, from 50 to 630 rpm.

One worker can attend this complex machine tool. If the part needs to be turned, the worker merely presses a button and the operation is performed.

The milling cutter is set automatically according to special gauges for the necessary depth of cut and relative position of slots. Machining accuracy is thus guaranteed.

The design of the new machine tool provides for a minimum amount of labor on the part of the worker. All heavy operations such as the moving of parts or of auxiliary mechanisms are performed by 22 electric motors. Push-button control of all working and auxiliary mechanisms is centralized at control panels located in the workers area.

This outstanding machine tool was built at the Gor'kiy Milling Machine Plant according to plans drawn by the Special Design Bureau of the Ministry of Machine Building USSR. It is intended for machining rotors for 3,500 to 150,000-kilowatt turbogenerators and rotors for powerful synchronous generators; /the rotors are/ made of special steel.

The calculated productivity of the new machine tool is 2.5-3 times as high as that of existing machine tools. However, this is not the limit of its performance. In testing the new machine tool with milling cutters made of hard-alloy steels, by merely increasing the speed, its productivity increased six-fold. -- A. P. Rybkin, professor, deputy chief of the Technical Administration of the Ministry of Machine Building USSR